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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/022,349	12/20/2001	Hann-Ping Hwang	HWAN3013/EM	2598

23364 7590 10/17/2002

BACON & THOMAS, PLLC  
625 SLATERS LANE  
FOURTH FLOOR  
ALEXANDRIA, VA 22314

EXAMINER

WILLE, DOUGLAS A

ART UNIT	PAPER NUMBER
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2814

DATE MAILED: 10/17/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

10/022,349

Applicant(s)

HWANG ET AL.

Examiner

Douglas A Wille

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-- The MAILING DATE of this communication appears on the cover sheet with the corresponding address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 27 August 2002.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 20-36 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 20-36 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

**Priority under 35 U.S.C. §§ 119 and 120**

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413) Paper No(s). \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_

## DETAILED ACTION

### *Claim Rejections - 35 USC § 112*

1. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

2. Claims 1 and 29 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

3. Claim 1, line 7 and claim 29, line 7 have "...a separated insulation layer which separates the photodiode and the high-speed bipolar, consisting of the above components...". What does the above components mean? It seems to be referring to both the detector and the BJT. In addition, in line 8 there seems to be a connective missing between "components" and "the". Is and missing? Claim 29 also has "o" rather than "of" in line 8.

### *Claim Rejections - 35 USC § 103*

4. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.
5. Claims 20 – 23, 25, 27 – 32, 34 and 36 are rejected under 35 U.S.C. 103(a) as being unpatentable over Matsuoka et al. in view of Kubo et al.
6. With respect to claims 20 and 29, Matsuoka et al. show (see cover Figure and column 4, line 49 et seq.) a detector and a BJT on a common substrate, with air insulation between, a collector contact layer 2 and collector layers 3 – 7, a base layer 8 and an emitter layer 9. In the detector, layers 2a – 8a are the pin diode (column 6, line 26) and there are absorbing layers between 2a and 8a. Matsuoka et al. show the InGaAs material system and Kubo et al. show (see

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cover Figure and column 4, line 49 et seq.) a similar device where the structure is SOI, with detector 27 and BJT 28, trench isolation 5 between the devices and the base/emitter is SiGe. The SOI structure allows the photosensor to be fast and low power (column 4, line 60) and the BJT to achieve faster operation (column 5, line 48). It would have been obvious to form the Matsuoka et al. device with the Kubo et al. structure to take advantage the speed and power capabilities of the Kubo et al. materials and structure.

7. With respect to claims 21 and 30, the substrate of Kubo et al. is Si.
8. With respect to claims 22 and 31, the insulation of Kubo et al. is a filled trench.
9. With respect to claims 23 and 32, the collector of Kubo et al. is Si.
10. With respect to claims 25 and 34, the base and emitter of Kubo et al. are SiGe and it would be obvious to design the device to meet the speed requirements.
11. With respect to claims 27 and 36, the emitter and collector of Kubo et al. are n-type and the absorption region is either i-, n- or p-type.
12. With respect to claim 28, the emitter of Kubo et al. covers part of the base.
13. Claims 24 and 33 are rejected under 35 U.S.C. 103(a) as being unpatentable over Matsuoka et al. in view of Kubo et al. and further in view of Sugiyama et al.
14. Neither Matsuoka et al. nor Kubo et al. show a superlattice but Sugiyama et al. show a similar device (see Figure 17 and column 14, line 10 et seq.) where the photodetector 25 is a Si/SiGe superlattice (column 7, line 35) where the superlattice permits operation at the 1.3 micron wavelength (infrared) used for optical fiber communication (column 1, line 15 – 48). It would have been obvious to modify the basic device to include the superlattice to provide operation at the communication wavelength and since the advantage of the device is also that

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inexpensive silicon processing can be used (column 1, line 28) it would be obvious to make all of the structure of the same layer. Since the material is SiGe,  $x$  is between 0 and 1.

15. Claims 26 and 35 are rejected under 35 U.S.C. 103(a) as being unpatentable over Matsuoka et al. in view of Kubo et al. and further in view of Jang.

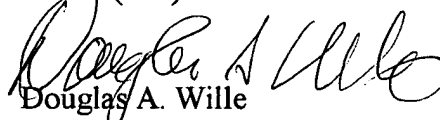
16. The base and emitter of Kubo et al. are SiGe but neither Matsuyama et al. nor Kubo et al. show the thickness of the emitter. Jang shows a BJT (see cover Figure and column 2, line 66 et seq.) where the thickness of the emitter is 0.1 micron which is greater than 10 nm. It would have been obvious to use this thickness since it is known to be functional.

### *Conclusion*

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Douglas A Wille whose telephone number is (703) 308-4949. The examiner can normally be reached on M-F (6:15-3:45).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Olik Chaudhuri can be reached on (703) 306-2794. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 308-7722 for regular communications and (703) 308-7722 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

  
Douglas A. Wille  
Patent Examiner

daw  
October 10, 2002